

AMENDMENTS TO THE CLAIMS

1. (Currently amended) A method for operating a vision system, comprising:
~~to determine~~ determining a set of coordinates for a plurality of edge points along an edge contour of an object,
- wherein the plurality of edge points extend over a depth range greater than the depth of field of an image of the edge contour, and the method comprising:
wherein determining the set of coordinates comprises:
- (a) determining the XYZ coordinates for at least a latest previous edge point in at least a latest previous edge point source image;
 - (b) automatically determining a next edge point XY trial location based at least partially on the XY location of the latest previous edge point;
 - (c) determining a ~~desired~~ next edge point source image ~~based on the next edge point XY trial location and previously acquired data, wherein the next edge point source image may be different than the latest previous edge point image due to the latest previous edge point and the next edge point being in focus at different focus positions; and that is focused at a different~~ Z coordinate than the latest previous edge point source image, including at least one of:
 - (i) evaluating a focus characterization in the vicinity of the next edge point XY trial location for a plurality of previously acquired images corresponding to a plurality of focus positions,
 - (ii) estimating a Z coordinate of the next edge point in the vicinity of the next edge point XY trial location based on previously acquired data,
 - (iii) estimating a focus position corresponding to a well focused image of the next edge point in the vicinity of the next edge point XY trial location based on previously acquired data, and

(iv) acquiring a plurality of images that include the next edge point XY trial location and that correspond to a plurality of focus positions over a range that includes a focus position corresponding to the Z coordinate of the latest previous edge point; and

(d) searching for the next edge point in the ~~desired~~ next edge point source image.

2. (Currently amended) The method of Claim 1, wherein ~~the previously acquired data comprises a plurality of images acquired at a plurality of corresponding focus positions and~~ the step of determining a ~~desired~~ next edge point source image comprises selecting ~~[[the]]~~ one of the plurality of previously acquired images that is determined to have the best focus in the vicinity of the next edge point XY trial location.

3. (Currently amended) The method of Claim 1, wherein the previously acquired data comprises the determined XYZ coordinates for the latest previous edge point and for a previous edge point before the latest previous edge point, and the step of determining a ~~desired~~ next edge point source images comprises:

determining an estimate Z coordinate in the vicinity of the next edge point XY trial location; and

acquiring ~~a desired~~ the next edge point source image at a focus position ~~based on~~ corresponding to the estimate Z coordinate.

4. (Currently amended) The method of Claim 3, wherein the step of determining an estimated Z coordinate in the vicinity of the next edge point XY trial location comprises:

determining a line through the determined XYZ coordinates for the latest previous edge point and the previous edge point before the latest previous edge point; and

determining an extrapolated Z coordinate on the line in the vicinity of the next edge point XY trial location.

5. (Currently amended) The method of Claim 1, wherein the ~~previously acquired~~ data comprises a plurality of images acquired at a plurality of corresponding focus positions and the step of determining a ~~desired~~ next edge point source image comprises:

~~determining~~ evaluating a focus characterization in the vicinity of the next edge point XY trial location for ~~at least some of the~~ a plurality of previously acquired images corresponding to a plurality of focus positions;

fitting a curve to at least some of the determined focus characterizations as a function of the corresponding focus positions;

determining a best focus position corresponding to a peak of the fitted curve; and

acquiring ~~[[a]] the desired~~ next edge point source image based on the determined best focus position.

6. (Original) The method of Claim 5, wherein the focus characterization comprises a contrast value.

7. (Original) The method of Claim 6, wherein the contrast value comprises a peak-gradient value determined along a scan line in the at least some of the plurality of images.

8. (Currently amended) The method of Claim 7, wherein the same scan line location is used in the step of searching for the next edge point in the ~~desired~~ next edge point source image.

9. (Currently amended) The method of Claim 8, wherein the same peak-gradient value is used in the step of searching for the next edge point in the ~~desired~~ next edge point source image.

10. (Currently amended) The method of Claim 1, wherein the step of determining a ~~desired~~ next edge point source image comprises:

estimating a focus position corresponding to a well focused image of the next edge point in the vicinity of the next edge point XY trial location based on previously acquired data; and

~~determining a desired next edge point focus position based on the next edge point XY trial location and the previously acquired data; and~~

determining ~~a desired~~ the next edge point source image based on the ~~desired~~ estimated ~~next edge point~~ focus position.

11. (Canceled)

12. (Currently amended) The method of Claim 1, wherein ~~when~~ the step of searching for the next edge point in the ~~desired~~ next edge point source image determines includes determining the XYZ coordinates of the next edge point, and the method further comprises:

the just-determined next edge point becomes the latest previous edge point;

the ~~desired~~ next edge point image becomes the latest previous edge point image; and

the method iteratively continues with the step of automatically determining a next edge point XY trial location.

13. (Currently amended) The method of Claim 1, wherein the step of searching for the next edge point in the ~~desired~~ next edge point source image comprises:

performing at least one edge detection operation along a scan line spaced at a present scan line sample interval from the latest previously determined edge point and coinciding with the next edge point XY trial location in the ~~desired~~ next edge point source image.

14. (Original) The method of Claim 13, wherein if the at least one edge detection operation along a scan line coinciding with the next edge point XY trial location fails to detect an edge point, a new scan line is defined spaced at one half of the present scan line sample interval from the latest previously determined edge point, and a new next edge point XY trial location is

established coinciding with the new scan line, and the second determining step and the searching step are repeated.

15. (Original) The method of Claim 14, wherein when the one half of the present scan line sample interval is less than a predetermined minimum scan line sample interval, the searching step further comprises:

defining a new scan line sample interval larger than the present scan line sample interval;
and

performing edge detection operations along scan lines determined in multiple directions that are tangential to a circular pattern that is centered around the latest previously determined edge point and that has a radius equal to the new scan line sample interval, until an edge point is detected.

16. (Original) The method of Claim 1, wherein the method is employed for operating a vision system during a learn mode of operation.

17. (Original) The method of Claim 1, wherein the method is employed for operating a vision system during a run mode of operation.